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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,485	10/16/2003	Jen Kuang Fang	4459-087A	5378

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LOWE HAUPTMAN GILMAN & BERNER, LLP
Suite 300
1700 Diagonal Road
Alexandria, VA 22314

EXAMINER

SMOOT, STEPHEN W

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 11/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/685,485	Applicant(s) FANG, JEN KUANG	
	Examiner Stephen W. Smoot	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office action is in response to applicant's amendment filed on 18 August 2004.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (US 6,437,240 B2 from applicant's IDS) in view of Ho et al. (US 6,507,104 B2).

Referring to Fig. 25 and column 29, line 45 to column 31, line 39, Smith discloses a semiconductor packaging method that includes the following features:

- A flexible dielectric sheet (1512) with a plurality of contacts (1519) formed on one side;
- A semiconductor chip (1524a) with a plurality of solder bumps (1550a) on its active side;

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- A heat sink (1542) with a plurality of solder bumps (1550b) attached to one side;
- The heat sink (1542) can be made of metal (see column 26, lines 38-42);
- The semiconductor chip (1524a) is positioned on the dielectric sheet (1512) with the solder bumps (1550b) aligned with the contacts (1519);
- The heat sink (1542) is positioned on the semiconductor chip (1524a) with the solder bumps (1550b) aligned with a corresponding plurality of contacts as shown in Fig. 25;
- The solder bumps (1550a and 1550b) are sequentially reflowed; and
- The remaining space between the dielectric sheet (1512), the chip (1524a), and the heat sink (1542) is encapsulated with a flowable material (1534) that is subsequently cured.

These are limitations set forth in claims 11-14 of the applicant's invention.

However, Smith lacks a simultaneous solder reflow step, which is a limitation set forth in claim 11 of the applicant's invention. Ho et al. teach a simultaneous solder reflow step for joining a heat sink, a chip, and a substrate together (see column 4, lines 51-55).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the teachings of Smith by using the simultaneous solder reflow step as taught by Ho et al. in order to eliminate a second solder reflow step. Ho et al. recognize that eliminating process steps simplifies processing (see column 2, lines 33-36).

3. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (US 6,437,240 B2 from applicant's IDS) and Ho et al. (US 6,507,104 B2) as applied to claim 11 above, and further in view of Wu (US 5,777,385 from applicant's IDS).

As shown above, the combination of Smith and Ho et al. have all of the limitations set forth in claim 11 of the applicant's invention. However, this combination lacks the further limitation to claim 11 set forth in claim 15 of the applicant's invention, which is to use a dummy chip as the heat sink. Wu teaches a heat spreader (21) that includes a silicon layer (22) and that has solder joints (25) for connecting to an integrated circuit chip (27) (see Fig. 2 and column 3, lines 16-21).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combined teachings of Smith and Ho et al. by substituting the silicon-containing heat spreader, as taught by Wu, for the metal heat sink. Such a substitution would have the advantage of reducing or minimizing stresses caused by thermal mismatch between the chip and the heat sink because a silicon-containing heat sink would have a closely matched thermal expansion to that of a silicon semiconductor chip.

Response to Arguments

4. Applicant's arguments filed 18 August 2004 have been fully considered but they are not persuasive.

In response to applicant's argument that Smith teaches away from the simultaneous reflow step of Ho et al. by teaching two solder reflow steps with different melting temperatures (see pages 6-7), the applicant is relying on an alternative embodiment taught by Smith (see column 32, lines 1-8), which is actually teaching another way to reflow their solder bumps (1550a and 1550b).

In response to applicant's argument that Ho et al. teach a method of forming a semiconductor package that is different from that of Smith (see pages 6-7), the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00 am to 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sws

Stephen W. Smoot
Patent Examiner
Art Unit 2813